

P68. COMPARATIVE STUDY OF THE POLYPROPYLENE IRRADIATED VERSUS POLYPROPYLENE WITH PRO-DEGRADANT ADDITIVE EXPOSED TO THE NATURAL AGING

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Polypropylene (PP) is used for numerous applications in different sectors of industry due to its very good physical, chemical properties and its very low price. Consequently its use results in large amounts of waste discarded at the landfills causing serious environmental impacts. Structural changes in PP molecule are created upon exposure to ionizing radiation such as: main chain scission, crosslinking, peroxidation (in presence of air). Controlled degradation of PP can be active by exposing the polymers to well-defined parameters, such as radiation dose, antioxidants, oxygen etc. [1,2]. The aim of this study is to compare two methods of accelerated degradation: gamma irradiation of PP 20 kGy and the incorporation of commercial prodegradant d2w® (1wt.%) in PP. Dumbbell samples were manufactured by injection molding and exposed to the environment during 90 days. The samples were characterized by, Optical Microscopy (OM), Fourier Transform Infrared Spectroscopy (FTIR), Thermogravimetric Analysis (TGA), Differential Scanning Calorimetry (DSC) and Mechanical Testing. The samples PP 20 kGy, after environmental aging, showed oxidation with presence of surface cracks more intensely than the PP d2w®, presence of carbonyl groups, and a decrease of melting temperature indicating degradation.

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References

- [1] R.G. Romano, W. L. Oliani, D. F. Parra, A.B. Lugao. Evaluation of environmental aging of polypropylene irradiated versus pristine. TMS - Characterization of Minerals, Metals, and Materials. John Wiley & Sons, Inc., Hoboken, New Jersey-EUA, (2016) p.729-736.
- [2] K. Makuuchi, S. Cheng. Radiation Processing of Polymer Materials and its Industrial Applications. John Wiley & Sons, Inc., New Jersey-EUA, (2012) p.216.